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GPE SERIES

MODULAR STABILISED
POWER SUPPLIES

Power Supply Handbook

coutant
The modern art of power

Coutant Electronics Ltd.

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INTRODUCTION

The GPE Series of fully enclosed modular power supplies provides a range of single and twin outputs; single units at 5, 12 or 15, 24 or 28 and 48 volts at current levels from 1-15 Amps, twin units at 12-15 volts from 1-5 Amps. Internal overvoltage protection is available as an option on all units.

All fixing centres and overall dimensions are compatible with the existing GP range, thus ensuring ease of replacement.

This range is designed to conform to P.O. technical guide 26 where mains and d.c. terminals are separated; also mains wiring is routed separately.

Units have also been designed to conform to the creepage and bonding specs. BS3861, IEC 380 and DIN for electrical safety of office machine.

GPE SPECIFICATION

I/P Voltage	110, 220 & 240V A.C.$\pm$ 10% 115V +5, $-$10%
I/P Frequency	48–65 Hz
O/P Voltage Range	5V, 12 or 15V, 24 or 28V, 48V, 2 x 12-15V
O/P Voltage Adjustment	$\pm$0.5V min.
Remote Sensing	On all units for up to 0.5V total loss on output cables.
O/P Current	Units from 1A to 15 amps.
Line Regulation	$<$0.01% + 1mV for $\pm$10% mains variation.
Load Regulation	$<$ 0.03% for no load to full load change.
Ripple & Noise	$<$1 mV peak to peak to 10MHz.
Operating Temperature	-10^{o}C to $+70^{o}$C derate by 2½/^{o}C from 50^{o}C
Storage Temperature	-20^{o}C to $+85^{o}$C.
Temperature Coefficient	Typically 0.005%/^{o}C (Max. 0.015%/^{o}C).
Transient Response	Typically 30us to within 10mV of V out for 10-100% or 100-10% load change.
Overload Protection	Re-entrant characteristic operating between 115-125% of full load.
Overvoltage Protection	Optional. Adjustable to 120% of V nom.
Reverse Polarity Protection	By diode across output.
Series & Parallel Connection	See Notes.
Insulation Resistance	O/P to earth $>$30MΩ at 500vdc.
Flash Test	Line & N–earth 2.5KV A.C. for one minute.

APPLICATION NOTES

Series Operation

Any number of units may be operated in series providing the 500v insulation is not exceeded.

Parallel Operation

Two similar units may be operated in parallel to provide increased available load current. By connecting the 'P' terminals current sharing will take place. If O.V. protection is fitted, this must be disabled by removal of O.V.PCB (unsolder or cut through pins marked A, B, R & -VC).

The unit which is set to the highest o/p voltage becomes the 'master'.

N.B. When operated in parallel a derating factor of 10% must be applied to each unit. i.e. 2 GPE 1000/12 units operated in parallel will supply 12V @ 18 Amps.

O.V. Protection

Overvoltage protection may be fitted after manufacture simply by removing the front panel of the unit and soldering the O.V.P. devices to easily accessible pins.

Approx. Weights:

Size:	A	B	C	D
Weight:	1.8 Kg.	2.7 Kg.	5.8 Kg.	10.5 Kg.

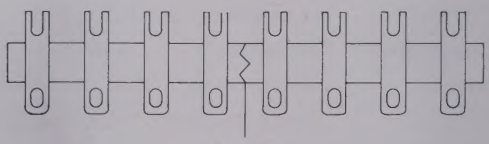
M.T.B.F.: Calculated using MIL217B at 50°C Ambient at Full Load.

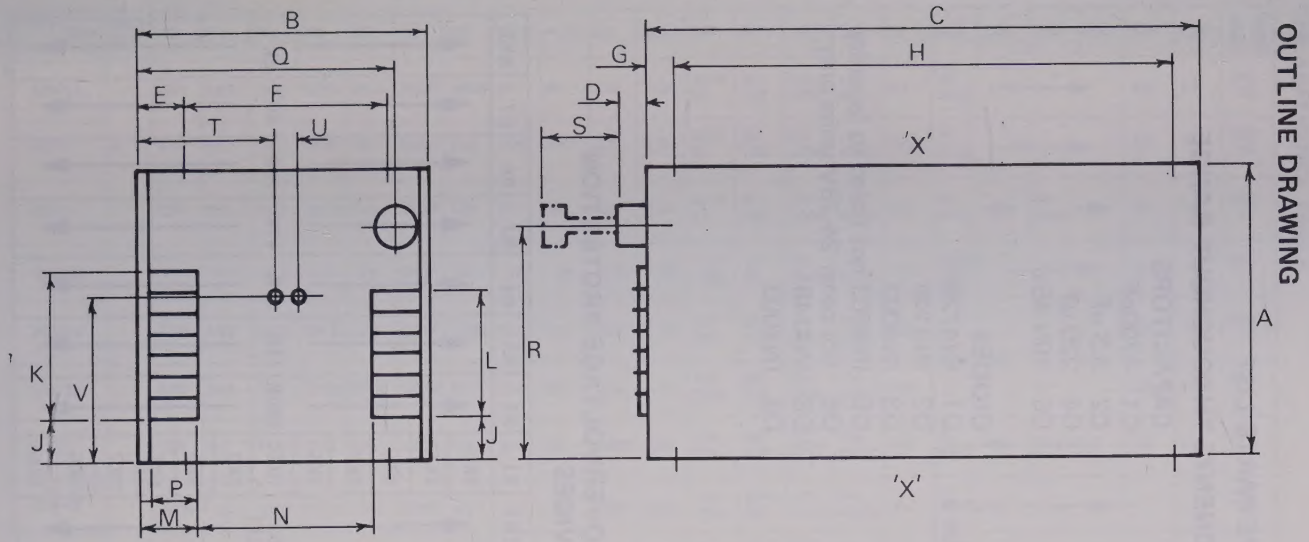
Case	A	B	C	D
Time (Hrs.)	75,000	70,000	64,000	48,000

Tap Changes (Secondary)

12 or 15 volts and 24 or 28 volts. When changing the O/P voltage of the above units, the mains transformer secondary should be set to the higher option when using the higher O/P voltage. This connection is located on the mains transformer.

The GPE unit replaces our corresponding GP unit and is electrically and mechanically interchangeable, except that input and output connector blocks are separated for improved safety. Where a fanning strip is used it may be modified as below to fit a GPE unit. The P terminal is not normally connected.





OUTLINE DRAWING

UNIT	OVERALL DIMS.				FIXING CTRS.				TERMINAL CONNS.						FUSE			ADJ. POT.		
SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
A	80	80	174	5	15	50	8.5	155	11	46	40	19.3	41.5	16	68	60	30	13.7	12.5	58.6
B	125	80	180	5	15	50	12.5	155	16	46	40	18.6	42.7	16	66.5	75	30	34.6	10	72.5
C	125	125	240	12	17.5	90	12.5	215	20	67	57.8	25.4	74.2	22.2	110	102	35	33.8	11	72.5
D	125	190	240	12	10	170	12.5	215	20	67	57.8	25.4	74.2	22.2	110	102	35	33.8	11	72.5

CUSTOMERS FIXINGS M4 X0,7 FULL THREAD 10 DEEP.
RECOMMENDED CLEARANCE HOLE ϕ 5,5.

DIMENSIONS IN mm.

'X' VENTILATED COVERS PROVIDE SPACE FOR CONVECTION COOLING.

GPE PARTS LIST

STANDARD COMPONENTS THROUGHOUT RANGE

RESISTORS

R1 OR5
R2 100R
R10 47K
R11 100R
R12 10K
R13 2KO
R14 2K7
R15 2K7
R16 22K
R17 3K3

R11–18 comprise a thick film array

R18 750R
R50 100R

CAPACITORS

C1 4700pF
C2 3.3 uF
C4 220 uF
C5 10N 45v

DIODES

D1 IN4728
D2 IN4148
D3 IN4003
D5 IN4003 not fitted to 5v units
D6 12v zener 24-28V units only
D8 IN4148
D9 IN4003

INTEGRATED CIRCUIT

ICI uA723

REFERENCE TABLE FOR OVERVOLTAGE PROTECTION DEVICES

Rating / CCT. Ref.	SCR1	C1	D1	D2	TR1	R1	R2	R3	R4	R5	R6	R7	RV1
12/15v 1A	BT151	0.1uF	10v	IN 5402	BC 212	2K7	680R	33R	33R	47R	10R	A0T	2K
24/28v 1A			20v			3K6							
5v 2A			4V3			10K							
12/15v 2A			10v			2K7							
24/28v 2A			20v			3K6							
5v 5A			4V3			10K							
12/15v 5A			10v			2K7							
24/28v 5A			20v			3K6							
5v 10A	2N 6504		4V3			10K							
12/15v10A			10v			2K7							
24/28v10A			20v			3K6							
5v 15A			4V3			10K							

CCT REF / UNIT	SIZE REF.	R3	R4	R5	R6	R7	R8	R9	RV1	RV2	C3	C50	TR1	TR2	TR50	D4	D7	D50	D51	D52	D53	FS1	FS50	[illegible]	[illegible]
100/12	A	47R	1K8	2KO	OR5	3K9	330R	100R	5K	5K	220	2.2K	BFR 81	BC 108	2N 3055	1N 4003	6.2V	1N 4003 →				2A	1A	296 79	
100/24		47R	4K7	1K2	OR5	5K6	560R	2K2	10K	5K	220	2.2K	BFR 81	BC 108	2N 3055	1N 4003	18V	1N 4003 →				2A	1A	296 80	
200/5		10R	S/C	1K8	OR25	S/C	120R	10R	2K	2K	470	4.7K	BFR 81	BC 108	2N 3055	1N 4003	S/C	1N 4003 →		1N 5402 →		3A	1A	296 77	
100/48	B	47R	5K1	2K0	OR5	24K	560R	4K7	5K	5K	100	2.2K	TIP 32B	BFY 50	2N 3442	1N 4003	S/C	PM7A 2Q →				2A	1A	297 17	
200/12		47R	1K8	2KO	OR22	3K9	330R	100R	5K	5K	220	4.7K	TIP 32A	BC 108	2N 3055	1N 4003	6.2V	KBBC 602				3A	1A	296 71	
200/24		47R	5K8	1K2	OR22	5K6	560R	2K2	10K	5K	220	4.7K	TIP 32A	BC 108	2N 3055	1N 4003	18V					3A	1A	296 72	
500/5		15R	S/C	1K8	OR1	S/C	120R	10R	2K	2K	1000	15K	TIP 32A	BC 108	2N 3055 X 2	1N 5402	S/C	1N 4003 →		PM6A2Q		7A	1A	296 70	
200/48	C	47R	5K1	2K0	OR22	24K	560R	4K7	5K	5K	220	3.9K	TIP 32B	BFR 39	2N 3442	1N 4003	S/C	PM74 4Q →						297 18	
500/12		47R	1K5	2KO	OR1	3K9	330R	100R	5K	5K	470	9K	TIP 32A	BC 108	2N 3055 X3	1N 5402	6.2V	PM7A 2Q				7A	3A	296 75	
500/24		47R	4K7	1K2	OR1	5K6	560R	2K2	10K	5K	470	9K	TIP 32A	BC 108	2N 3055 X3	1N 5402	18V					7A	3A	296 76	
1000/5		10R	S/C	1K8	OR1	S/C	120R	10R	2K	2K	1000	22K	TIP 32A	BC 108	2N 3055 X3	1N 5402	S/C	1N 4003 →		PM6A2Q		15A	3A	296 73	
500/48	D	47R	5K1	2K0	OR1	24K	560R	4K7	5K	5K	220	2X 56K	TIP 32B	BFR 39	2N 3442	1N 4003	S/C	SKB 30-02-31						297 19	
1000/12		47R	2KO	2KO	OR05	3K9	330R	100R	5K	5K	470	10K X2	TIP 32A	BC 108	2N 3055 X5	1N 5402	6.2V	SKB 30-02				15A	5A	296 83	
1000/24		47R	4K7	1K2	OR05	5K6	560R	2K2	10K	5K	470	12K X2	TIP 32A	BC 108	2N 3055 X6	1N 5402	18V					15A	5A	296 84	
1500/5		10R	S/C	1K8	OR05	S/C	120R	10R	2K	2K	1000	15K X2	TIP 32A	BC 108	2N 3055 X6	1N 5402	S/C	1N 4003 →		16 F10 →		20A	5A	296 81	

CIRCUIT DESCRIPTION

The output from the mains transformer is rectified and filtered to provide a smooth supply which is fed to TR50. On units of 12v and above the Vcc voltage for the integrated circuit is supplied by D5, R9 and C4; whilst on 5v units an auxiliary rail is provided by D50, D51, R9 and C4.

The voltage reference in the integrated circuit is tapped down by R14 and R15 and fed to the non inverting input of the comparator. A portion of the output voltage is sensed across R5 which is fed to the inverting input of the comparator. The output drive from the I.C. is fed via TR1 to the series element TR50.

The output current is sensed across R6. The potential of the emitter of TR2 is set by RV1 thus as the current rises the voltage across R6 rises and TR2 is turned on. The collector current of TR2 is drawn through R10 until D8 is forward biased, at this point TR2 begins to remove the drive to the internal series pass element in the I.C.

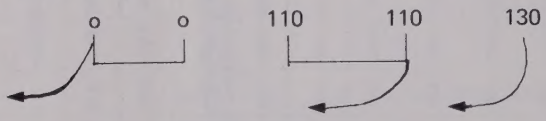
O.V. Option

RV1 gives a limited range of adjustment of firing voltage. At some voltage determined by the setting of RV1, TR1 is turned on and fires the SCR. The voltage across D2 is tapped down by R7 and R8 (on p.s.u.), the voltage developed across R8 turns TR2 on thus inhibiting the control circuit so that a small current passes through the SCR.

TRANSFORMER TAP CHANGING (PRIMARY)

Transformer Primary should be linked as follows:

110 volt Operation

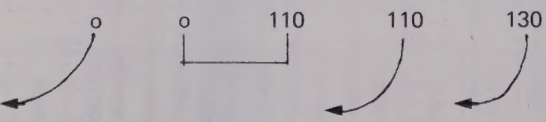


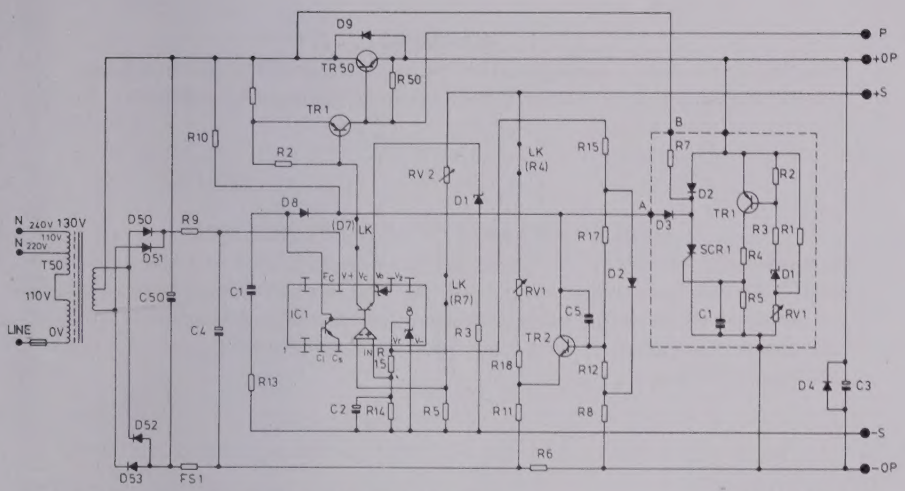
Cable to Front Panel.

Mains Fuse should be as shown in Reference Table.

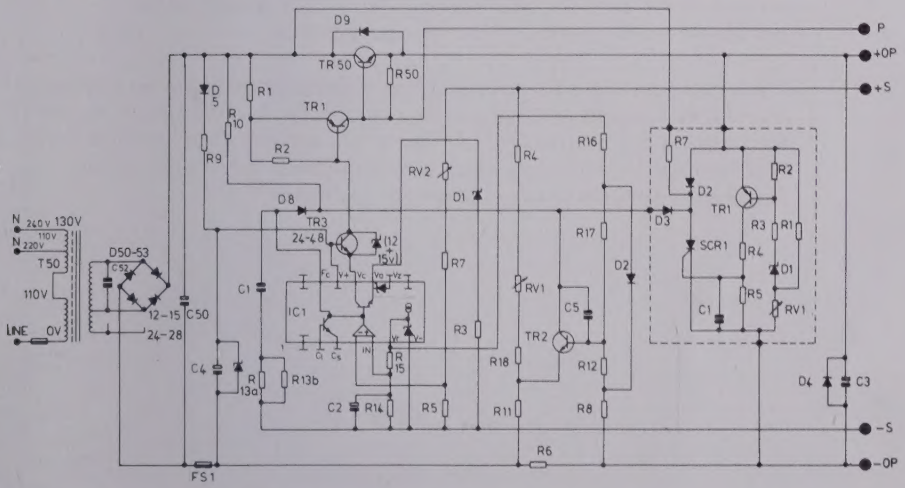
Front Panel is reversible to ensure correct Terminal legend.

220/240 volt Operation





GPE CIRCUIT DIAGRAM 5V UNITS O/V OPTION



GPE CIRCUIT DIAGRAM 12/15 & 24/28V UNITS O/V OPTION

WARNING

When the mains supply is connected to the mains connector block on a power supply dangerous voltages will be present on some components within the unit.

HEALTH AND SAFETY AT WORK ACT 1974

We have reasonable grounds to believe that we have ensured, so far as is practicable, that our product has been so designed and constructed as to be safe and without risks to health, when properly installed and used in its intended environment by appropriate and trained personnel, and in accordance with our published instructions.

SPARES AND SERVICE

1. A full stock of tested spare parts is held at our Ilfracombe factory for customers who require to repair units themselves. The nature of the circuitry does not permit changing of components on the P.C.B's without special test facilities, however whole P.C.B. assemblies are available as spares. See parts lists for type numbers.

2. If it is necessary to return power supplies to the Service department please ensure they are adequately packed for the journey. The units must also be accompanied by information as to their origin, and the nature of the defect. This information will greatly assist in giving a speedy turn round, please supply too much information rather than too little.

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